

**The ALMEGA CORPORATION**

*10 file*  
*file 031600 AMe*  
*Reports*

EPA Region 5 Records Ctr.



307738

New Battery, Ducon Scrubber System  
Particulate Emission Measurements,  
Formal EPA Tests  
Republic Steel  
August 11, 12 and 13, 1983  
The Almega Corporation Project I-5766  
The Almega Corporation Report I-5766-1

REPUBLIC STEEL CORP.  
CHICAGO DISTRICT  
**RECEIVED**

AUG 24 1983

K. L. BROWN

# **The ALMEGA CORPORATION**

607 C Country Club Drive  
Bensenville, Illinois 60106  
Phone: (312) 595-0175

August 19, 1983

Republic Steel  
116 and Burley Avenue  
Chicago, Illinois 60617

Attention: K.W. Hazard, Chief Engineer

Subject: Particulate Emission Measurements,  
New Battery Ducon Scrubber System  
Formal EPA Tests  
Republic Steel  
August 11, 12 and 13, 1983  
The Almega Corporation Project I-5766  
The Almega Corporation Report I-5766-1

Gentlemen,

## INTRODUCTION

Testing was performed on August 11, 12 and 13, 1983 to measure the particulate emission rates at the outlet of the Ducon Scrubber System controlling the coal charging emissions on the new battery at Republic Steel.

The purpose of the tests was to establish the particulate emission rates of the plant when operating at rated capacity, for comparison with EPA emission regulations.

Testing was performed by Meryl R. Jackson, T. Armstrong and J. Bowman of The Almega Corporation. The plant was operated by personnel of Republic Steel. Plant operating data were recorded by personnel of Republic Steel. Tests were witnessed by John Connell and John McGuire of USEPA and by Fred Smith of Illinois EPA.

## DESCRIPTION OF PLANT

Coal charging emissions are picked up at the charge machine on the top of the battery, and are conveyed to a Ducon venturi scrubber located at the south west corner of the battery. The venturi throat opening is adjustable by vane dampers. The venturi opening and liquid flow rates were preset by Republic Steel and its contractors prior to this test series.

The scrubbed exhaust gas is passed via two parallel I.D. fans to a free standing stack and discharged at a height of approximately 100 feet.

## THE ALMEGA CORPORATION

Particulate concentratin and emission rate was determined following Method 5 (Ref. 1) included in Appendix F. The gas velocity and moisture determinations were conducted simultaneously with the particulate emission testing.

The particulate catch included nozzle, probe, and prefilter washings, and filter particulates as detailed in Method 5.

A pyrex glass-lined stainless steel sampling probe and stainless steel sampling nozzle was used for all test runs.

Test results are expressed in terms of grains/scf db, lbs/scf db, lbs/hr.

### SUMMARY OF TEST RESULTS

Results of the particulate test series are summarized in Table 1.

The field test, laboratory analysis data, and calculation summaries are presented in Appendix G.

Copies of relavent equipment calibration data are presented in Appendix H. Equipment leak check data are recorded on the field data sheets.

Chain-of-Custody records are presented in Appendix I.

### DISCUSSION OF TEST RESULTS

Test results show an averaged particulate emission concentration of 0.02 grains/scf, measured during 24 coal charge periods.

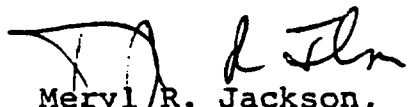
### CONCLUSION

A series of particulate emission tests were performed on the Ducon Scrubber System on August 11 to 13, 1983. Test results show the emission concentration to be 0.02 grain/scf.

We are pleased to have been of service to Republic Steel and look forward to further opportunities of serving your needs.

Respectfully submitted,

THE ALMEGA CORPORATION

  
Meryl R. Jackson,  
Vice-President

# The ALMEGA CORPORATION

## SUMMARY OF EMISSION TEST DATA

TABLE: 1

PLANT: Ducon Scrubber System

LOCATION: Republic Steel

REPETITION #:

2

3

4

TEST DATE:

8/11/83

8/12/83

8/13/83

### STACK GAS

Temperature, average °F

116.5

113.0

117.7

Velocity average fps

35.0

35.1

34.9

Volume flow x 10<sup>6</sup> scfh db

1.705

1.733

1.706

Orsat, average % CO<sub>2</sub>

0.2

1.0

0.4

O<sub>2</sub>

18.9

18.9

19.0

CO

0.1

0.5

0.1

Moisture %

4.7

5.5

5.4

### PARTICULATE SAMPLE

Time, hrs:mins:secs

1:43:25

1:35:25

1:34:41

Volume scf db

65.905

62.678

60.523

Particulates collected, grams

0.0971

0.0790

0.0718

Isokinetic Ratio, I%

90 ≤ I ≤ 110

100.7

102.1

100.8

### PARTICULATE

Concentration grains/scf db

0.023

0.019

0.018

x 10<sup>-6</sup> lbs/scf db

3.249

2.779

2.616

Emissions lbs/hr

5.54

4.82

4.63

# **The ALMEGA CORPORATION**

## REFERENCES

- 1 Title 40: Code of Federal Regulations

## APPENDICES

- A Confirmation of Test Protocol
- B Method 1 -- Sample and Velocity Traverses  
for Stationary Sources
- C Method 2 -- Determination of Stack Gas  
Velocity and Volumetric Flow Rate (Type  
S Pitot Tube)
- D Method 3 -- Gas Analysis for Carbon Dioxide,  
Excess Air and Dry Molecular Weight
- E Method 4 -- Determination of Moisture in  
Stack Gases
- F Method 5 -- Determination of Particulate  
Emissions from Stationary Sources
- G Field Test and Laboratory Data and Summary  
Calculation Sheets
- H Equipment Calibration Data
- I Chain-of-Custody Records



## ILLINOIS ENVIRONMENTAL PROTECTION AGENCY

MEMORANDUM

DATE: February 14, 1984I.D. #: 031 600 AMCTO: Sy Levine, Region I ManagerDate of Inspection: January 27, 1984FROM: Edward Osowski *EO*

RECEIVED

SUBJECT: FACILITY: Republic Steel, Coke Plant

FEB 21 1984

ADDRESS: 11600 S. Burley Avenue, Chicago, IL. **IEPA-DAPC-SPELD**CONTACT/TITLE: Mr. Mike Thomas, Env. Engineer PHONE: \_\_\_\_\_PRE-INVESTIGATION STATUS:

<input checked="" type="checkbox"/> Workplan	<input checked="" type="checkbox"/> (A) Task Force	<input type="checkbox"/> (R) Random/Non-traditional
<input checked="" type="checkbox"/> Quarterly Report	<input type="checkbox"/> (B) On Program	<input type="checkbox"/> (S) HC Chicago
<input checked="" type="checkbox"/> Form 2	<input type="checkbox"/> (C) Violator	<input type="checkbox"/> (T) TSP Chicago
<input type="checkbox"/> Other	<input type="checkbox"/> (D) NESHAPS	<input type="checkbox"/> (U) A-1 (Act. 100 t/y)
	<input type="checkbox"/> (F) NSPS	<input type="checkbox"/> (V) B Facility (unc. 100)
	<input type="checkbox"/> (I) A-2 (unc. 100, Act. 100)	<input type="checkbox"/> (W) Multimedia Problems
	<input type="checkbox"/> (J) Special Request	<input type="checkbox"/> (X) Service Stations
	<input type="checkbox"/> (M) Toxics/Hazards	<input type="checkbox"/> (Z) Petrochemical Plants

INSPECTION FINDINGS:

<input checked="" type="checkbox"/> Emission Violation	<input checked="" type="checkbox"/> Warning Letter	<input checked="" type="checkbox"/> TAS Checked
<input type="checkbox"/> Permit Violation	<input type="checkbox"/> To Form 2 Report	<input type="checkbox"/> TAS Coded
<input type="checkbox"/> Permit Cond. Viol.	<input type="checkbox"/> To Quarterly Report	<input checked="" type="checkbox"/> Form 177
<input type="checkbox"/> No Violation		<input checked="" type="checkbox"/> Flowform
		<input type="checkbox"/> Malf(Wang)

NARRATIVE:

On January 27, 1984 an inspection was conducted of Republic's coke oven by Mr. Cezary Krzymowski and the author. Mr. Mike Thomas, Environmental Engineer, was contacted about the inspection.

The inspection of the battery started with the inspection of the oven doors. No doors were observed leaking on the coke side while seven doors (numbers 32, 36, 38, 46, 47, 57 and 58) were observed leaking on the push side. The percentage of leaking door is 5.83 percent. The allowable is ten percent. The doors were in compliance.

After inspecting the doors, the author timed the charging emissions while Mr. Krzymowski inspected for leaking lids and offtaking piping. Mr. Krzymowski observed zero leaking offtake pipes and six leaking lids. The percentage of leaking offtake pipes was determined to be zero while the percentage of leaking lids was determined to be 2.5 percent. The allowable for offtake piping is five percent while charging hole lids is two percent. The offtake piping was in compliance, while the lids were not in compliance.

February 14, 1984  
ID# 031 600 AMC

Page 2

Five ovens were observed to be charged. (Ovens 1, 3, 5, 7 and 9). Emissions from the charging of the five ovens totaled to 2.63 seconds. The allowable is 55 seconds. Charging was determined to be in compliance.

Mr. Thomas was asked about the current rate of coke production. Mr. Thomas stated that the battery is currently being operated at a rate of 66 ovens pushed per day. Design of the battery allows a maximum of 90 ovens pushed per day. Three pushes were observed on ovens one, five and seven by Mr. Krzymowski. Pushing emissions capture efficiency appeared to be at least 90% and the opacity of non captured emissions was less than 20% while the baghouse stack opacity was zero. No formal readings were taken due to the marginal position of the sun at the time of the observations.

A CIL was sent on February 2, 1984 regarding the leaking lids. Mr. Thomas stated that he would experiment with different lid sealing compounds.

EO/gp/1751A

Observer: E. Osawski, C. Krzymowski  
 Observation Date: 1-27-84  
 Other Representatives Present:

[illegible]

5 Ovens

CHARGING HOLE	#1 Battery	#2 Battery	Total Lid Leaks
LID LEAKS	37 36 42 49 52 56		6

Date: 1-27-84

Ageng Kajimawati



## ILLINOIS ENVIRONMENTAL PROTECTION AGENCY

*Telford*  
*file 10 file FOS*  
MEMORANDUM

DATE: March 27, 1984  
TO: Sy Levine  
FROM: Cezary Krzymowski *CK* ~~*[Signature]*~~  
SUBJECT: Republic Steel - Permit Conditions  
ID# 031 600 AMC

RECEIVED

MAR 29 1984

IEPA - DAPC - SPFLD

During the March 14, 1984 pre-enforcement conference, Republic expressed certain changes they would like made in the permit conditions as stated in the authors memo of March 5, 1984. These are as follows:

- 1). They requested that the coke battery charging scrubber stack condition requiring a 0.02 gr/dscf emissions limitation be changed to 0.03 gr/dscf. They feel this condition is too tight even though they met it as an average of three stack tests whose results were 0.023, 0.019 and 0.018 gr/dscf. This condition was taken from their IEPA construction permit application and was not a part of the USEPA PSD permit.

The author recommends that this condition remain at 0.02 gr/dscf. This outlet concentration is routinely attainable for high pressure drop venturi scrubbers as a review of other stack tests and Republic's stack test indicates. Since the nature of coke oven charging emissions are known or suspected carcinogens sometimes reported as benzene soluble organics (BSO) it would be inappropriate to allow a looser standard. The author believes that with proper maintenance the 0.02 gr/dscf standard can be achieved on a continuous basis. Should any problems arise in the future they can petition the Agency for relief at that time.

- 2). They inquired whether they would be required to retest their combustion stack at different production capacities when they switch to enriched blast furnace gas. They presently push 66 ovens per day and design output is 90 ovens per day which they believe might not ever be reached.

The author recommends that the test be conducted 30 days after the commencement of enriched blast furnace gas firing at the production rate schedule in effect at that time. Although increased production rates are not foreseen to have a significant adverse effect on underfiring combustion efficiency and stack effluent, the Agency reserves the right to request a stack test at any time stack opacity observations indicate an increase from those observed during the stack test.

- 3). They requested that the 20% opacity limit specified in their PSD permit be reduced by using some type of averaging method.

Conversations with Ed Wojciechowski of USEPA indicated that this would be acceptable. The author recommends that opacity data reduction be accomplished by averaging six highest consecutive readings in each push for five consecutive pushes.

- 4). They stated that the Q-BOP furnaces were designed to operate one at a time only and that in order to operate simultaneously they would have to extensively rebuild the system.

The author agrees that this condition can be deleted.

- 5). The Q-BOP turndown bell valve damper system has now been automated and they requested that this language be rewritten.

The author agrees that Republic rewrite this condition language to suit the present operating practices.

- 6). They inquired whether the standard for leaking coke oven doors was 5% or 10%.

The author stated it was 5% as written in the USEPA PSD permit copy supplied by Republic with their permit application. The June 21, 1982 IEPA Permit Section letter to Republic was in error. FOS has been using 5% as the standard during inspections.

After approval of the above changes, a redraft of the permit conditions will be given to Republic.

CK/gp/1908A

cc: Dan Goodwin  
Miles Zamco  
Peter Orlinsky  
Permits  
File

*file PD fill.*  
*Permits*  
*FOS*



Illinois Environmental Protection Agency · 2200 Churchill Road, Springfield, IL 62706

(For Internal Use Only)

Date of Inspection: August 8, 1984

**RECEIVED**

I.D.#: .031 600 AMC R/D: 105

**AUG 29 1984**

*CK* Facility: Republic Steel (LTV)

Address: 11600 S. Burley Avenue, Chicago, IL

**IEPA - DAPG - SPFLD**

Contact/Title: Mr. Mike Thomas, Envir. Engineer Phone: \_\_\_\_\_

PRE-INVESTIGATION STATUS:

<input checked="" type="checkbox"/> Workplan	<input checked="" type="checkbox"/> (A) Task Force	<input type="checkbox"/> (R) Random/Non-Traditional
<input checked="" type="checkbox"/> Quarterly Report	<input type="checkbox"/> (B) On Program	<input type="checkbox"/> (S) HC Chicago
<input checked="" type="checkbox"/> MIR	<input type="checkbox"/> (C) Violator	<input type="checkbox"/> (T) TSP Chicago
<input type="checkbox"/> Other	<input type="checkbox"/> (D) NESHAPS	<input type="checkbox"/> (U) A-1
	<input type="checkbox"/> (F) NSPS	<input type="checkbox"/> (V) B Facility
	<input type="checkbox"/> (I) A-2	<input type="checkbox"/> (W) Multi-Media Problems
	<input type="checkbox"/> (J) Special Request	<input type="checkbox"/> (X) Service Station
	<input type="checkbox"/> (M) Asbestos Demolition	<input type="checkbox"/> (Z) Petrochemical Plants

INSPECTION FINDINGS:

<input type="checkbox"/> Emission Violation	<input type="checkbox"/> CIL	<input checked="" type="checkbox"/> TAS Checked
<input type="checkbox"/> Permit Violation	<input type="checkbox"/> To MIR	<input checked="" type="checkbox"/> TAS Coded
<input type="checkbox"/> Permit Condition Violation	<input type="checkbox"/> To Quarterly Report	<input checked="" type="checkbox"/> Form 177
<input checked="" type="checkbox"/> NO VIOLATION	<input type="checkbox"/> Multi-Media Issue Possible	<input type="checkbox"/> Compliance Flow
<input type="checkbox"/> Flag File	<input type="checkbox"/> Land <input type="checkbox"/> Noise <input type="checkbox"/> Water	<input type="checkbox"/> Malfunction
		<input type="checkbox"/> Copy to Facility
		<input type="checkbox"/> Frequency Change

IL 532-1244  
 APC 421 7/84

The offtake pipings were then inspected for leaks. Three were observed to be leaking (7, 16, and 56). The percentage of leaking offtake pipings was five. The allowable is five percent. The offtake pipings were in compliance.

The charging lids were then inspected for leaks. Four lids were observed to be leaking (8-2, 38-1, 46-4, and 49-2). The percentage of leaking lids was 1.6 percent. The allowable is two percent. The lids were in compliance. The luting compound currently used on the lids is a premixed emulsion from Nalco.

The charging emissions were then timed. Five ovens were observed to be charged (ovens 15, 17, 19, 21, and 23). Emissions from the charging of the five ovens totaled 0.00 seconds. The allowable is 55 seconds. Charging emissions were in compliance.

Upon completion of the timing of the charging emissions, a sample of the quench tower make up water was taken. Analysis of the sample were not available at the time of this memo.

Mr. Thomas was then asked about the current rate of coke production. Mr. Thomas stated that the battery is currently being operated at a rate of 85 ovens pushed per day. Design of the battery allows a maximum of 90 ovens pushed per day. This information will be coded in the TAS.



ILLINOIS ENVIRONMENTAL PROTECTION AGENCY  
Division of Air Pollution Control--Field Operations Section

MEMORANDUM

DATE: August 20, 1984 Date of Inspection: August 8, 1984  
TO: Sy Levine, Mgr., Region 1 I.D.#: 031 600 AMC  
FROM: *CK* Edward Osowski *EO* Region: 1 District: 5  
SUBJECT: Facility: Republic Steel (LTV) IEPA DAPC-SPFLD  
Address: 11600 S. Burley Avenue, Chicago, Illinois  
Contact/Title: Mr. Mike Thomas, Envir. Engineer Phone:

RECEIVED

AUG 29 1984

On August 8, 1984, an inspection was conducted of Republic Steel's Coke Battery. Mr. Mike Thomas, Environmental Engineer was contacted about the inspection.

The inspection of the battery started with the observation of the oven doors. Four doors (5, 9, 11, and 13) were observed leaking on the coke side while five doors (9, 10, 11, 12, and 58) were observed leaking on the push side. The percentage of leaking doors is 7.50 percent. The allowable is ten percent. The doors were in compliance.

The offtake pipings were then inspected for leaks. Three were observed to be leaking (7, 16, and 56). The percentage of leaking offtake pipings was five. The allowable is five percent. The offtake pipings were in compliance.

The charging lids were then inspected for leaks. Four lids were observed to be leaking (8-2, 38-1, 46-4, and 49-2). The percentage of leaking lids was 1.6 percent. The allowable is two percent. The lids were in compliance. The luting compound currently used on the lids is a premixed emulsion from Nalco.

The charging emissions were then timed. Five ovens were observed to be charged (ovens 15, 17, 19, 21, and 23). Emissions from the charging of the five ovens totaled 0.00 seconds. The allowable is 55 seconds. Charging emissions were in compliance.

Upon completion of the timing of the charging emissions, a sample of the quench tower make up water was taken. Analysis of the sample were not available at the time of this memo.

Mr. Thomas was then asked about the current rate of coke production. Mr. Thomas stated that the battery is currently being operated at a rate of 85 ovens pushed per day. Design of the battery allows a maximum of 90 ovens pushed per day. This information will be coded in the TAS.

ID# 031 600 AME  
August 20, 1984

Page 2

Hydrogen sulfide compliance monitoring was then discussed with Mr. Thomas. Mr. Thomas stated that a grab sample is taken once a day. The hydrogen sulfide concentration is then determined using a starch-iodide procedure.

Finally, Mr. Thomas was asked if any changes in operations had occurred at the facility. This was due to two complaints being received about kish in the neighborhood. Mr. Thomas stated that no changes in operations or equipment had occurred.

The complaints and the coke oven battery inspection checklist are attached with this memo.

EO/gkw/0245A

CC - M. Zamco  
- Permit Section  
- Region 1 File

## COKE OVEN BATTERY INSPECTION CHECKLIST

Other Representatives Present: Mike Thomas  
LTV

[illegible]

5 Ovens

OVEN DOOR LEAKS	#1 Battery	#2 Battery	Total Door Leaks
Coke Side	5, 9, 11, 13		4
Pushing Side	5, 8, 12, 11, 10, 9		5

STANDPIPE	#1 Battery	#2 Battery	Total Stdp Leaks
LEAKS	56 16 7		3

CHARGING HOLE	#1 Battery	#2 Battery	Total Lid Leaks
LID LEAKS	[8,2], [38,1], [46,7], [49,2]	.	4

Observer's Signature: Edward J. Nowak  
Date: 8-8-84

State of Illinois  
Environmental Protection Agency  
Division of Air Pollution Control

271 CAD  
File  
Date of Call 7/11/84 031600A  
Time of Call 12:20  
Received by Barothy

COMPLAINT RECORD

Suspect Source Information:

Name Republic Steel  
Address 11600 So. Burley Ave.  
City, Zip Chicago, Ill. 60617  
Area Code/Phone \_\_\_\_\_  
I.D. # 031600AMC

Complainant Information:

Name Anonymous  
Address \_\_\_\_\_  
City, Zip \_\_\_\_\_  
Area Code/Phone \_\_\_\_\_

Type of Complaint: ☐ Dust ☐ Odors ☐ Smoke ☒ Other small particles of graph

Nature of Complaint: Adding something to steel maybe  
silicone or graphite and when it comes out of the  
stack it falls and it is very small just like pepper  
flakes, it is so small it comes into the screens  
and gets all over everything and by it be so small  
it is hard to get off of the furniture. It use to  
go on just once and a while now it happens very  
often. When you go out it gets all on your skin.  
thinks it is bad to be breathing stuff like this.

Referred to: ☒ Unit A ☐ Unit B ☐ Unit C ☐ Other \_\_\_\_\_

Comments: No  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

☐ DISTRIBUTION: Original and Copy - Unit Supervisor Copy - Wang

State of Illinois  
Environmental Protection Agency  
Division of Air Pollution Control

Date of Call 8-7-84  
Time of Call 4:10 p  
Received by Jeanne

### COMPLAINT RECORD

Suspect Source Information:

Name Republic Steel  
Address \_\_\_\_\_  
City, Zip Chicago  
Area Code/Phone \_\_\_\_\_  
I.D. # 03

Complainant Information:

Name Thomas Granczewski  
Address 11358 Avenue O  
City, Zip Chicago  
Area Code/Phone 374-0136

Type of Complaint: ☒ Dust ☐ Odors ☐ Smoke ☐ Other \_\_\_\_\_

Nature of Complaint: \_\_\_\_\_

lives behind Q-BOP and says that for the past  
two weeks there has been a continuous stream of  
dirt (graphite) coming from the roof.

Referred to: ☒ Unit A ☐ Unit B ☐ Unit C ☐ Other Ed O.

Comments: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

☐ DISTRIBUTION:      Original and Copy - Unit Supervisor      Copy - Wang



ILLINOIS ENVIRONMENTAL PROTECTION AGENCY

MEMORANDUM

*file 031 600 35-8 10 file AM C*

DATE: February 10, 1986

TO: Sy Levine

FROM: C. Krzymowski *CK*

SUBJECT: LTV Steel - Coke and By-Products Plant Inspection

RECEIVED

FEB 18 1986

IEPA - DAPC - SPFLD

An inspection of the coke and by-products plant was conducted on Feb. 7, 1986 by Ed Osowski and the author.

Mr. John Potwora represented LTV Steel.

The inspection revealed that there were two coke side and two push side door leaks, three standpipe leaks and zero lid leaks. Five ovens were timed for visible emissions and the total seconds were 1.8. The allowable leaks are six doors, three standpipes, 4.8 lids and fifty-five seconds for charging emissions. A make-up water sample was taken and was sent for analysis to the laboratory. Three pushes were also observed and the hood captured more than 90% of the emissions generated. Opacity readings of these pushes indicated an average of 2.5% over six readings. The inspection checklist is attached.

The by-products plant was inspected for leaks from components in light oil liquid service. The facility has an adequate inspection program and monitoring log which the author was allowed to inspect. No leaks were detected from the components inspected. The inspection checklist is attached.

The coke and by-products plant were found to be in compliance.

CK/lp/0620L

cc: M. Zamco  
Permits  
File

Attachment

Observer: FD Osowski / Cezary Krzyzanski  
 Observation Date: 2-7-86  
 Other Representatives Present: John Peterson

[illegible]

Average Seconds of Emissions  
Per Oven Charged 0.3

CHARGING HOLE	#1 Battery	#2 Battery	Total Lid Leaks
LID LEAKS	0		

Observer's Signature: Gregory Krzyzanski  
Date: 2/15/11

2/83

2-7-86

WEEKLY INSPECTIONOFLIGHT OIL RECOVERY SYSTEM

INSPECTION TO CONSIST OF: Visual inspection for loose mounting bolts, pump noise or vibration, leaks at pump, packing gland, discharge valve, casing drain valve and tank drain, discharge sampling valve, pressure switch assembly.

<u>EQUIPMENT</u>	<u>LOCATION</u>	<u>REMARKS</u>
1. Wash Oil Pump 5803A	Light Oil Scrubbers	
2. Wash Oil Pump 5803B	Light Oil Scrubbers	
3. Wash Oil Pump 5803C	Light Oil Scrubbers	
4. Scrubber Tank - East	Light Oil Scrubbers	
5. Scrubber Tank - West	Light Oil Scrubbers	
6. Hot Wash Oil Pump 7109A	Light Oil Recovery Pump House	not in service
7. Hot Wash Oil Pump 7109B	Light Oil Recovery Pump House	not in service make seal - some leaking but not serious
8. Debenzolyzed Wash Oil Pump 7110A	Light Oil Recovery Pump House	
9. Debenzolyzed Wash Oil Pump 7110B	Light Oil Recovery Pump House	not in service